(19) Europäisches Patentamt
European Patent Offic
Office uropéen des brevets

(11) Publication number: 0 495 100 A1

(12) EUROPEAN PATENT APPLICATION published in accordance with Art. 158(3) EPC

(21) Application number: 90910884.7

(22) Date of filing: 31.07.90

(86) International application number: PCT/JP90/00975

(87) International publication number: WO 92/02157 (20.02.92 92/05)

(51) Int. Cl.5: A44C 25/00, A44C 5/10, A44C 27/00, B21F 45/00, B21F 27/18

(43) Date of publication of application: 22.07.92 Bulletin 92/30

(84) Designated Contracting States: CH DE FR GB IT LI

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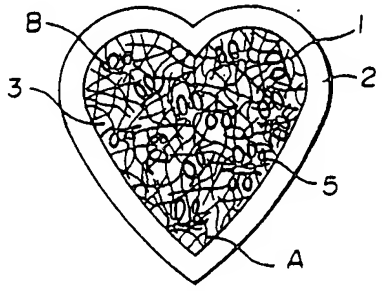
(54) METALLIC MESH FOR ORNAMENTAL GOODS AND METHOD OF MANUFACTURE THEREOF.

(57) A metallic mesh (1) to be used as a material for ornamental goods such as brooch, pendant, earring, and so on, in which a large number of fine metallic wires (A, B) are stacked in the direction of the thickness of a mass thereof while randomly intersecting each other and the intersections of the wires (A, B) are pressed or fixed to each other, whereby some patterns created by the wires (A, B) themselves appear on the surface of the mass and a multiplicity of vacant spaces (3) in various shapes and sizes are randomly formed between the wires (A, B). A method of manufacturing the metallic mesh (1) comprises collecting a large number of the wires (A, B) and pressing them into a plate as well as pressing or fixing them to be bonded to each other at the intersections of the wires.

FIG. 1



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FIELD OF THE INVENTION

This invention relates to a metallic mesh suitable for a material of ornamental goods.

BACKGROUND OF THE INVENTION

Various kinds of materials have been used as a material for personal ornaments such as brooch, pendant, earring, and so on. In the case of manufacturing a large-sized luxury personal ornaments, precious metals in pure form, such as gold, silver, and platinum are generally used as materials for the above ornaments. However, the pure precious metals are very expensive and they have relatively large specific gravities for uses as personal ornaments. Thus, if the pure precious metals are used as the materials for manufacturing the above ornaments, the product is of high-priced and heavy-weight and it cannot be suitable for personal belongings. In addition, it is known that a mass of pure precious metals having relatively large thickness is difficult to be processed by cutting, bending, twisting or the like mechanical processing meas.

BRIEF SUMMARY OF THE INVENTION

An object of the present invention is to provide a metallic mesh having own excellent appearance to be easily processed to a personal ornament of large-size and low weight, and also to provide a method of manufacturing the above metallic mesh with relatively low cost.

For accomplishing the above objective, the metallic mesh in accordance with the present invention is characterized as follows.

The metallic mesh is made of a large number of fine metallic wires which are stacked in the direction of the thickness of a mass thereof while they are randomly intersected with each other. The intersections of these wires are pressed or fixed to each other, whereby some patterns created by the wires themselves appear on the surface of the mass, and in addition, a large number of vacant spaces in various shapes and sizes are randomly formed between the wires.

It is preferable that the metallic wire described above is made of precious metal such as gold, silver and platinum, or a precious metal alloy. Also, it is thought that the metal wire has a non-circular cross section and a polished flat surface along its peripheral surface.

Further, a method of manufacturing the metallic mesh in accordance with the present invention is characterized by comprising the steps of accumulating a large number of the wires to provide a mass and compressing the mass into a plate formed mass as well as to bond to each other at their intersected portions. If necessary, the intersected portions of the wires are further processed so as to be tightly fixed with each other by the method of diffused junction, metal plating, resin coating, or the like.

It is preferable that the bonding between the intersected portions of the wires is performed by heating to produce a diffused junction. It is that the metal wires may be pre-treated by the resin coating.

Furthermore, it is preferable that each metallic wire is subjected to a curling process before subjecting the mass of the metallic wires to any one of the above described bonding treatments.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG.1 illustrates an example of the ornamental goods manufactured by using a metallic mesh in accordance with the present invention.

FIGS. 2 and 3 illustrates metallic wires used in the present invention.

FIG. 4 illustrates a mass of the accumulated metallic wires.

FIG. 5 illustrates an enlarged sectional view of the metallic mesh.

FIG. 6 illustrates an enlarged view of the metallic mesh.

FIG. 7 illustrates an enlarged sectional view of the metallic mesh having a flat portion on its surface.

BEST MODE OF CARRYING OUT THE INVENTION

A preferable embodiment of the present invention will be described with reference of the accompanying drawings.

FIG. 1 shows an ornament of the preferred embodiment of the present invention which is manufactured by processing a metallic mesh 1 into a heart form and putting a frame 2 around the heart.

The above metallic meshes 1 is formed by a large number of fine metallic wires A, B which are stacked in the direction of the thickness of a mass while they are randomly intersected with each other. The intersections of the wires A, B are pressed or fixed to each other, whereby some patterns are created by theses wires A, B themselves and appear on the surface of the mass. Also, a large number of vacant spaces 3 in various shapes and sizes are randomly formed between the above wires A, B.

Referring to FIGS. 2 to 7, a construction of the metallic mesh and a method of manufacturing the same will be explained in more detail.

The metallic mesh 1 is manufactured from two

types of metallic wires A, B as shown in FIGS. 2 and 3, respectively. These metallic wires A, B are made of a precious metal selected from gold, silver, and platinum, or a precious metal alloy comprising at least two precious metals (for example, 90% of platinum are alloyed with 10% of palladium).

The diameter of the above metallic wires A, B is not limited, but it is preferable that each wire has its own diameter, for example the metallic wire A has a diameter of about 0.3 mm while the metallic wire B has a diameter of about 0.5 mm. Also, it is preferable that each wire has its own length in the range of several centimeters. In this example, the metallic wires A, B have their own curled form. That is, the metallic wire A is twisted into a coil spring form having three dimensions, while the metallic wire B is twisted into a plurality of rings which are connected to each other in a same plane.

In the process of manufacturing a metallic mesh 1 from the above described metallic wires A, B, as shown in FIG. 4, the wires A, B are randomly accumulated in a space between a pair of circular pressing plates 4, 4 so as to make a mass of the wires in the height of about 3 cm, for example. In this case, the specific gravity of the metallic mesh 1, and also a multiplicity of vacant spaces to be formed in the metallic mesh 1, can be suitably established by selecting a proper concentration of the accumulated wires A, B in the metallic mesh 1 by increasing or decreasing the amount of the metallic wires A, B in the mesh 1. It is that the wires A, B are randomly accumulated in the metallic mesh 1, or in another way, the wires A, B are accumulated in accordance with a certain pattern. Referring to FIG. 4, an example of the latter, the metallic wires B are localized in top and bottom layers.

The metallic wires A, B accumulated in the space between the pressing plates 4,4 are pressed by means of the conventional pressing apparatus so as to make a thin plate form of the accumulated wires having a thickness of about 0.5 mm to 1.0 mm.

As a result of the above pressing process, the metallic mesh 1 having a large number of vacant spaces 3 in various shapes and sizes is produced. In the metallic mesh 1, these vacant spaces 3 are randomly formed between the twisted metallic wires A, B by randomly intersecting and overlapping the twisted wires A, B having non-elastic properties. The intersected portions of the wires A, B are mechanically pressed or fixed to each other, and also some patterns created by the wires A, B themselves randomly appear on the surface of the m tallic mesh 1 for providing its original external appearance. Accordingly, the external appearance of the metallic mesh 1 can be obtained as if a microscopic examination were performed on the surface thereof.

According to the above description, it is obvious that the surface patterns and the vacant spaces 3 of the metallic mesh 1 cannot be anticipated form beforehand in the above manufacturing process. However, it is possible to form the above patterns and vacant spaces 3 having anticipated shapes and sizes to some extent. In order to form the anticipated patterns and vacant spaces 3 of the metallic mesh 1, the wires A, B are appropriately accumulated before the pressing process. For example, the patterns having a ring pattern created by the large diameter wires B which are connected with each other by the small diameter wires A, are formed as follows. The metallic wires B in the form of large-diameter rings in the same plane are mainly localized in top and bottom layers of the accumulated wires, while the metallic wires A in the form of small-diameter coil springs are mainly distributed between these layers. Therefore, when the accumulated wires are pressed, the metallic wires A is extensively deformed into flat wires while the metallic wires B is hardly deformed. Consequently, the ring patterns are formed on the surface of the metallic mesh 1 which stand above the rest of the surface.

The metallic mesh 1 prepared as described above can be used as a material for manufacturing a personal ornament because the intersections of the wires A, B are pressed or fixed to each other. In the modified embodiment, however, the intersections of the wires A, B are joined together by the diffused junction in which the heating treatment is performed on the metallic mesh 1 provided between the pressing plates 4,4 at an appropriate temperature. In this case, an upper limit of the heat temperature is the melting points of the material of the wires A, B, but it is preferable that the temperature is just below the melting point. Because, when the heating temperature is higher than the above melting point, the surface patterns described above are disappeared and also the vacant spaces 3 are occupied by the melted wires A, B. Thus, the metallic mesh 1 is heated at about 1,200 °C when the wires A, B are made of an alloy of platinum and palladium because the melting point thereof is about 1,500 °C.

When the wires A, B are joined to each other by the diffused junction, it is preferable that the intersections of the wires is simultaneously heated and pressed. In this case, the mass of the wires A, B provided in the space between the pressing plates 4, 4 is supplied into an appropriate press-and-heat apparatus for simultaneously heating and pressing the wires A, B. Preferably, when the wires A, B are subjected to the diffused junction, the

wires A, B are simultaneously heated and pressed by an integrated press and heat apparatus from the beginning of the manufacturing process. Therefore, at the beginning, the metallic wires A, B are accumulated in a space between the pressing plates 4, 4 and then they are supplied into the integrated press and heat apparatus in which the wires A, B are pre-pressed at normal temperature. Following that, the wires A, B are pressed at high temperature by the apparatus. Consequently, the bonding and the diffused junction described above can be successively and efficiently performed by means of only one integrated press-and-heat apparatus.

The pressing plates 4 described above are made of a heat-resistant material such as carbon-graphite and alumina because the pressing plates 4 should have a property of high heat-resistance for the diffused junction. When the wires A, B are made of platinum, however, there is no need to make the pressing plates 4 by a material of carbon-graphite because the platinum is easily react with the carbon at high temperature. In this case, therefore, the pressing plates should be made of a heatproof material which does not contain any carbon, or alternatively the pressing plates should be coated by a protecting material such as boron nitride by means of spray-coating.

In the process of manufacturing the metallic mesh 1, foregoing steps are followed by a finishing step in which preferable external appearance of the metallic mesh 1 is created. In this step, the metallic mesh 1 is subjected to cold rolling so as to form a flat face 5 on a projected portion of the surface of the metallic mesh 1 and then the flat face 5 is subjected to buffing to provide the lustrous surface on the projected portion. On the other hand, the recessed portion of the metallic mesh 1 is not subjected to the buffing and thus semi-lustrous faces of the wires A, B are remained. Thus the lustrous and semi-lustrous faces are responsible for creating an unique appearance on the surface of the metallic mesh 1. However, the above finishing step can be omitted when this step is not required. Instead of the cold rolling, for example, the flat face 5 can be obtained by polishing the surface of the metallic mesh 1 or by striking the surface with a hammer.

After the process of preparing the metallic mesh 1, it is further processed to an ornament illustrated in FIG. 1. In this example, the metallic mesh 1 is cut into an appropriate shape such as a heart shape which is surrounded with a frame 2 by means of the soldering or the casting.

According to the foregoing description, the metallic mesh 1 in accordance with the present embodiment is preferably used as a material for ornamental goods. Because, the metallic mesh 1 is characterized by its own external appearance created by the fine patterns of the wires A, B. Unique patterns are randomly appeared on the surface of the metallic mesh 1, while a multiplicity of vacant spaces 3 in various shapes and sizes are randomly formed between the wires A, B.

Also, the metallic mesh 1 in accordance with the present embodiment can be used as a material for large-sized luxurious ornamental goods having reasonable weight for practical uses because the specific gravity of the metallic mesh 1 is less than that of the pure precious metal plate.

In addition, the metallic mesh 1 in accordance with the present embodiment is relatively low-priced. Because the real amount of the pure metals used as the material for the metallic mesh 1 is relatively small in spite of its large size, and also because it is easily processed by cutting or bending compared with the pure precious metal plate.

Furthermore, in accordance with the process of manufacturing the metallic mesh 1 described above, the metallic mesh 1 is easily manufactured only by pressing the accumulated metallic wires A, B and also the complicated patterns appeared on the surface of the metallic mesh 1 is created by the metallic wires A, B which are curled before the pressing. The curled and intersected wires make a lot of intersections between the wires compared with the straight wires. Thus the curling treatment makes the metallic wires to be supported with each other.

According to the process of manufacturing the metallic mesh 1 described above, various external appearances of the metallic mesh 1, having its own surface patterns and the vacant spaces, can be unrestrictedly produced by taking proper steps of changing the length or diameter of the metallic wires A, B, the twisting condition or the curling condition, the amount of the wires A, B to be processed, and the accumulated condition of the wires A, B before the pressing, or the like.

Of course, it is quite difficult to manufacture the metallic meshes 1 having the identical patterns each other. However, it is advantageous to produce a material used for the ornamental goods having unique appearances.

Still much more, a material of the metallic wires A, B for manufacturing the metallic mesh 1 is not limited to precious metals described above. For example, a non-precious metal or an alloy, such as stainless steel, aluminum, copper, or the like, can be used for the extremely low-priced metallic mesh having the similar external appearance as of the metallic mesh comprising the precious metal.

As stated above, the metallic mesh 1 in accordance with the embodiment of the present invention comprises two types of metallic wires A, B having their own diameters, lengths, and curled shapes, but not limited to these wires If necessary,

it is possible to make the metallic mesh from only one type or from more than two types of metallic wires, or select freely one or more types of metallic wires having different colors, and textures (for example, gold and silver). When the metallic wires are respectively made of different materials, these materials may tend to alloy with each other during the step of the diffused junction in the process of healing the mesh. In this case, the joining portions between the wires may change their colors by the alloying of the materials of the wires, and resulting in a unique external appearance of the product. Following are examples of coloring the joining portion; yellow-colored portion can be obtained by a mass of the wires comprising 75 % of gold, 20 % of silver, and 5 % of copper; white-colored portion can be obtained by a mass of the wires comprising 75 % of gold, 20 % of palladium, and 5 % of silver; and pink-colored portion can be obtained by 75 % of gold, 5 % of silver, and 20 % of copper.

In the case of using metallic wires comprising pure copper, the color of the product comprising the metallic mesh molded by the press can be changed by heating the metallic mesh portion at an appropriate temperature in the atmosphere (i.e., oxidizing atmosphere). It is possible to coloring the product appropriately by changing the heating temperature. When the metallic mesh is heated at about 200 °C, for example, the above pure copper is changed to Cu_4O and the color turns to yellow. When the metallic mesh is heated at about 400 °C, the above pure copper is changed to Cu_2O and the color turns to red. When the metallic mesh is heated at about 700 °C, the above pure copper is changed to CuO and the color turns to black. When the metallic mesh is heated at a temperature between the above temperatures, the color turns to mixed colors, for example orange color which is a mixed color of yellow and red, purple color which is a mixed color of red and black.

It is thought that scraps of the precious metal, metal chips, fragments of metal foil or the like can be mixed with the metallic wires to make good use of the precious metals and to effect a change of the external appearance of the metallic mesh.

In the above embodiment, the metallic wires have circular cross section. However, the cross section of the wires is not limited to the circular shape. It is possible to take various shapes of the cross section, for example triangular, polygonal, star, flat tape, or the like. Also, the metallic wires having different or same cross sections can be twisted together to prepare a twisted wire. The twisted wire is responsible for changing the external appearance of the metallic mesh because each metallic wire has own reflecting property.

In the process of manufacturing the metallic mesh as described in the above embodiment, the process comprises the steps of collecting a large number of the curled metallic wires; pressing them into a plate as well as pressing or fixing them to be bonded to each other at the intersections of the wires; and subjecting the intersections to the diffused junction to join them each other if required. However, the present invention is not limited to the above embodiment, and it being understood that various changes in the steps of the above process may be resorted to without departing from the invention.

It is not exactly essential that the metallic wires are curled. The straight wires may be used instead of the curled wires. When the straight wires are used as a material of the metallic mesh, line patterns are formed on the surface of the mesh.

In the step of pressing the accumulated wires, it is not necessary that the intersections of the wires are bonded to each other. The pressing is performed so as to contact intersections of the wires with each other, and then these contacts are joined each other by the proper means after the pressing. In this case, each metallic wire is less deformed by the pressing and large sized vacant spaces are formed between the wires. Thus, the metallic mesh, which is characterized by its relatively large thickness and its relatively small specific gravity, can be produced.

In the above embodiment, the intersections described above are strongly joined to each other by the diffused junction. However, it is possible to used other methods instead of the diffused junction. For example, it is possible that the intersections of the metallic wires, which are being joined or contacted with each other, are plated with the precious metal. Also, it is possible to diffuse the resin into the vacancies of the metallic meshes so as to strongly bond the wires. When the non-precious metal such as stainless steel, aluminum or the like is used as a wire material, a non-precious metal mesh is produced from non-precious metal wires. Thus, intersections of these wires should be plated with precious metal so as to resemble to the precious metal mesh. On the other hand, when the metallic mesh is joined by diffusing the resin, the resin can act as an anti-rust agent for avoiding rust of the non-precious metallic wires and also act as an anti-oxidation agent for avoiding the change of color (into black) of the silver metallic wires by preventing the oxidation of the silver. In addition, it is possible to create various types of the external appearance of the product by diffusing transparent resin or colored resin, or combined thereof into the vacancies of the metallic mesh.

Furthermore, it is possible that the metallic wires are coated by an appropriate resin before the diffused junction step. In this case, the resin-coated wires are dissolved and re-solidified so as to join

the wires to each other at lower temperature and shorter period compared with a case of that the metallic wires are directly joined to each other.

INDUSTRIAL APPLICABILITY

As described above in detail, a metallic mesh in accordance with the present invention comprises a surface thereof having some patterns created by the metallic wires. In this metallic mesh, a large number of vacant spaces in various shapes and sizes are randomly formed between the metallic wires. Consequently, the metallic mesh in accordance with the present invention has its own external appearance and thus it can be preferably used as a novel material for ornamental goods. Particularly, a large sized ornament with its luxurious external appearance can be produced by using the metallic wires, which are made of a precious metal or a precious metal alloy, as a material. In this case, the manufacturing cost and the weight of the product are relatively low. Furthermore, the metallic mesh in accordance with the present invention comprises the metallic wires having lustrous flat portions on their surfaces and/or non-circular cross sections.

Consequently, the metallic mesh in accordance with the present invention has varied and complicated patterns.

A manufacturing method in accordance with the present invention comprises the steps of collecting a large number of the wires and pressing them into a plate as well as pressing or fixing them to be bonded to each other at the intersections of the wires. Therefore, the metallic mesh can be easily produced, and also various anticipated external appearances can be created on the surface of the metallic mesh. Also, the intersections of the wires can be strongly joined to each other so as to become one body.

It is possible to press the wires so as to contact their intersections with each other. In this case these intersections are joined to each other by the proper means after the pressing. Therefore, each metallic wire is less deformed by the pressing and thus large sized vacant spaces are remained between the wires.

It is also possible to join the intersections by the diffused junction, the precious metal plating, or the resin coating method. Each method can be easily performed, and produces tightly bonding between the intersections. Especially in the case of the diffused junction, the bonding strength can be raised by performing the heating and pressing treatments at the same time.

When the metallic wires are coated by an appropriat resin before the diffused junction, the wires are joined to each other at relatively lower temperature and relatively shorter period compared with a case of that the metallic wires are directly joined to each other by the press.

When the metallic wires are twisted into a curly form, complicated surface patterns of the metallic mesh can be obtained. Also, the bonding strength between the wires are relatively raised compared with the straight wires because a number of the intersections of the curled wires is greater than that of the straight wires.

Claims

1. A metallic mesh to be used as a material for ornamental goods, in which a large number of fine metallic wires are stacked to an appropriate thickness while randomly intersecting with each other, and the intersections of said wires are pressed or fixed to each other, whereby the patterns created by the wires themselves appear on the surface of said mass and a plurality of vacant spaces in various shapes and sizes are randomly formed between said wires.

2. A metallic mesh according to claim 1, wherein said fine metallic wire is made of a precious metal selected from gold, silver, platinum, and the like, or an alloy comprising said precious metals.

3. A metallic mesh according to claim 1 or 2, wherein said metallic mesh comprises a surface thereof having lustrous flat portions.

4. A metallic mesh according to claim 1, 2 or 3, wherein said fine metallic wire has a non-circular cross section.

5. A method of manufacturing a plate-shaped metallic mesh used as a material for ornamental goods comprising the steps of accumulating a large number of fine metallic wires and pressing them into a plate as well as pressing or fixing them to be bonded to each other at intersections of said wires.

6. A method according to claim 5, wherein said method further comprising the step of fixing said intersections of the fine metallic wires after said pressing.

7. A method of manufacturing a plate-shaped metallic mesh used as a material for ornamental goods comprising the steps of accumulating a large number of fine metallic wires, pressing them into a plate as well as pressing them to be contacted with each other at intersections

of said wires, and fixing said intersections to be bonded.

8. A method according to claim 6 or 7, wherein said intersections of the fine metallic wires are heated to produce bonded diffused junctions.

9. A method according to claim 8, wherein said intersections of the fine metallic wires are simultaneously heated and pressed.

10. A method according to claim 8 or 9, wherein said fine metallic wire surface is subjected to resin-coating treatment.

11. A method according to claim 6 or 7, wherein said intersections of the metallic wires are fixed by the means selected from the group consisting of precious metal plating and resin coating.

12. A method according to one of claims 5 to 11, wherein said fine metallic wire is subjected to curling treatment.

FIG.1

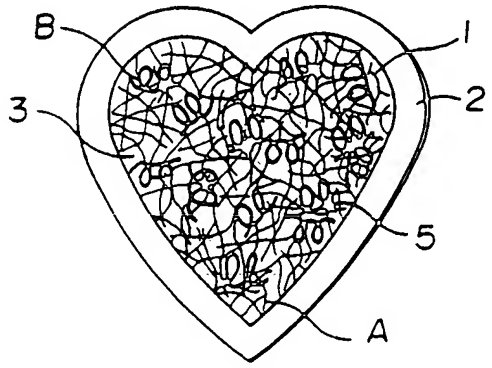


FIG.2

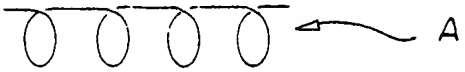


FIG.3

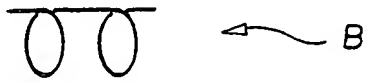


FIG.4

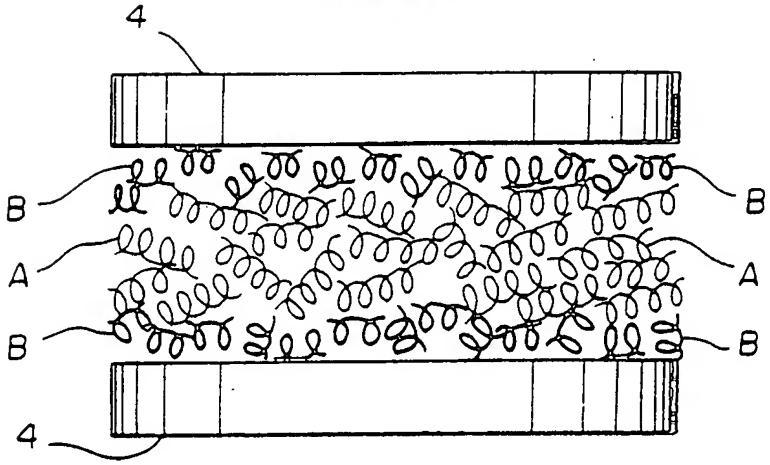


FIG.5

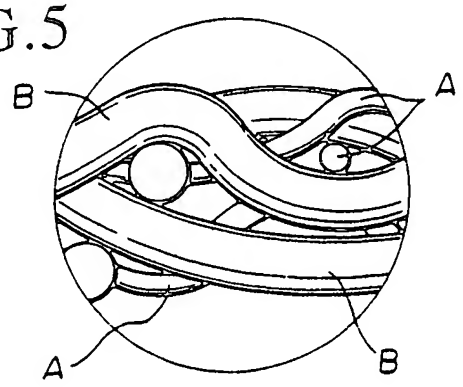


FIG.6

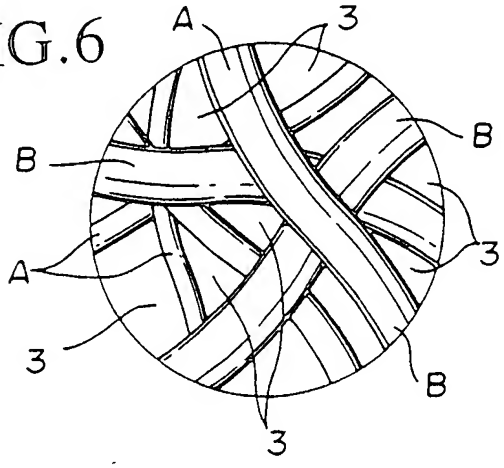
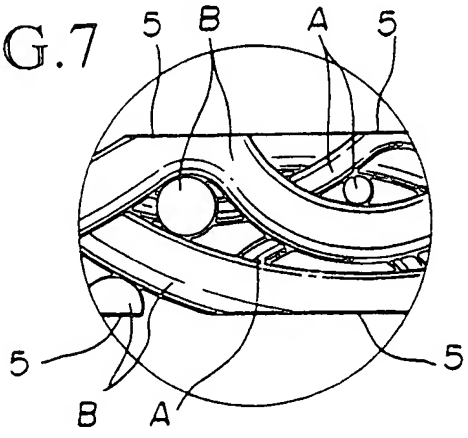


FIG.7



INTERNATIONAL SEARCH REPORT

International Application No PCT/JP90/00975

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl[5] A44C25/00, 5/10, 27/00, B21F45/00, 27/18

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System [8]	Classification Symbols
IPC	A44C25/00, 5/10, 27/00, B21F45/00, 27/02, 27/18, B22F5/00

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [9]

Jitsuyo Shinan Koho	1926 - 1990
Kokai Jitsuyo Shinan Koho	1971 - 1990

III. DOCUMENTS CONSIDERED TO BE RELEVANT [10]

Category [11]	Citation of Document, [12] with indication, where appropriate, of the relevant passages [13]	Relevant to Claim No. [13]
X	JP, B2, 54-38551 (Kyo Mashida), 21 November 1979 (21. 11. 79), Line 13, column 1 to line 35, column 2, Figs. 1 to 3 (Family: none)	1, 2, 4, 5, 12
Y	JP, B2, 61-24442 (Nippon Seisen K.K.), 11 June 1986 (11. 06. 86), Line 20, column 1 to line 4, column 2 (Family: none)	3, 6, 7, 8, 9
Y	JP, A, 50-160163 (Nippon Filcon Co., Ltd.), 25 December 1975 (25. 12. 75), (Family: none)	10
Y	JP, C2, 68986 (Felix Hirschiner Joseph Hess) 22 July 1926 (22. 07. 26) (Family: none)	11

[11] Special categories of cited documents: [14]

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
October 3, 1990 (03. 10. 90)	October 15, 1990 (15. 10. 90)
International Searching Authority	**Signature of Authorized Officer**
Japanese Patent Office	